EDISON

Seraphim Space Investment Trust

Initiation of coverage

Space tech – enabling a new industrial revolution

Investment company
Space technology

1 April 2022

Price	**104.8p**
Market cap	**£251m**
AUM*	**£251m**
NAV**	104.7p
*Premium to NAV	0.3%

*Based on current share price and last published NAV.
**At 31 December 2021.

Yield	0.0%
Ordinary shares in issue	239.4m
Code/ISIN	SSIT/GB00BKPG0138
Primary exchange	LSE
AIC sector	Growth Capital
52-week high/low	130.8p 91p
NAV* high/low	104.7p 98.9p

*Including income

Net gearing	0%
Net cash at 31 December 2021	£70m

Seraphim Space LLP (Seraphim Space), which manages the Seraphim Space Investment Trust (SSIT), believes the space technology market could grow 5–7x to c $2–3tn by 2035. Key drivers are the dramatic fall in the cost of launch, principally thanks to SpaceX, and a revolution in the satellite industry where technological developments originally pioneered within the smartphone and automotive industries have driven down the size, cost and weight of satellites while expanding their capability. In combination, these factors have increased the scale of deployment – creating a digital infrastructure in space according to Seraphim Space – enabling technologies in data collection and analytics to address key global needs in the climate, connectivity, mobility and security domains. SSIT is a unique listed vehicle giving investors access to that growth via a portfolio purely focused on space technology through predominantly unquoted early-stage growth companies. Its strategy is to invest for the long term, seeking companies that are leaders in their segment with a first-mover advantage and strong capital structure. Seraphim Space is a pioneer in space tech investment and has built deep knowledge networks. It is an early mover with a reputation for sourcing opportunities and partnering with other investment groups and corporates.

The analyst's view: For the adventurous investor

SSIT provides investors with a unique proposition for investment in potentially high-growth disruptive space technology. Seraphim Space generated a 49% internal rate of return (IRR) via its former private limited partnership (LP) fund, with the majority of those holdings seeding SSIT in July 2021. SSIT is targeting long-term annualised returns of 20% pa. Given SSIT's focus, it should appeal to growth-orientated investors with long-term investment horizons and a suitable attitude to risk. Such risks include potential failure of technology, illiquidity and additional funding requirements. However, Seraphim Space aims to mitigate these through its sector-specific focused investment strategy, strong advisory board and broad networks. In addition, SSIT's portfolio is heavily focused on climate and sustainability applications. The portfolio is still heavily concentrated, with its end December 2021 top five positions accounting for 55.9% of net asset value (NAV). However, we expect SSIT to deploy its c 27.9% (c £70m) cash holding to become fully invested over the next six months, which would diversify the portfolio further. In the medium term, SSIT may well look to raise further capital for new investments or to fund existing holdings through follow-on rounds and has an identified pipeline of c £88m of potential investments.

Market volatility and NAV lag drive the discount

SSIT shares have a short trading history and since launch have traded in a range of 90–133p versus SSIT's latest (end December 2021) NAV of 104.7p. SSIT has a niche appeal and a scarcity factor, which is likely to lead to continued fluctuations in the near-term premium amid market volatility. Over the long term, the shares will be driven by the performance of the underlying companies and the overall growth in the commercialisation of the space domain.

Company objective

Seraphim Space Investment Trust's objective is to generate capital growth over the long term through investment in a diversified, international portfolio of predominantly early- and growth-stage unquoted space tech businesses with the potential to dominate globally. Space tech businesses are businesses that rely on space-based connectivity or precision, navigation and timing signals, addressing a broad range of key applications.

Bull points

- Rare opportunity for pure-play exposure to a new, potentially large, game-changing sector.
- Experienced private equity team able to draw on a deep network of industry specialists.
- Space tech may prove transformational to climate management, and will provide future space-based digital platforms for communications, transport and security.

Bear points

- The nature of the technology brings execution and industry risk, and potential associated volatility. Investors should have a long-term investment horizon.
- The early-stage nature of SSIT's investments, the technology and unquoted nature make them difficult to value by standard means.
- The portfolio is currently pre-profit.

Analysts

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Company profile: Pure focus on space technology

SSIT is targeting capital growth of at least 20% pa over the long term via a diversified international portfolio of predominantly early and growth stage unquoted space technology businesses. It is the world's only publicly listed investment fund focusing solely on this particular subset of investment opportunities It was listed on the Main Market of the London Stock Exchange on 14 July 2021 after an initial public offering (IPO) raised £150m. Prior to becoming an investment trust, the managers ran the portfolio as the private Seraphim Space LP Fund. After the IPO SSIT acquired an initial portfolio of 15 companies (of the Seraphim Space LP fund's then 19 holdings) from the fund for a consideration of £28.4m, paid for in SSIT shares.

In addition to acquiring the initial 15 investments, SSIT agreed to purchase the remaining four companies from the Seraphim Space LP fund (Arqit, ICEYE, D-Orbit and Spire) by 31 December 2021. Further share issuance of £34.7m was used to purchase the limited partnership (LP) fund's holdings in Spire and Arqit in August and September, and in December SSIT announced the completion of the purchase of the remaining holdings from the LP Fund in ICEYE and D-Orbit for a consideration of £28.1m, also paid for in SSIT shares.

SSIT subsequently invested into two new companies, Hawkeye 360 and Astroscale, along with a series of follow-on investments into existing portfolio companies.

Exhibit 1: Investments made from IPO to the end of December 2021

Company	Segment/Sub-Sector	HQ	Type	Cost £m
Arqit Quantum	Platforms/Satcoms	UK	Retained Asset	27.3
ICEYE	Platforms/Earth Observation	EU	Retained Asset	20.8
ICEYE	Platforms/Earth Observation	EU	Follow-on	18.7
HawkEye 360*	Platforms/Earth Observation	US	New investment	18.6
Isotropic Systems	Downlink/Antennas	UK	Follow-on	18.0
Astroscale	Beyond Earth/In Orbit Services	Asia	New investment	9.4
Spire Global	Platforms/Earth Observation	US	Retained Asset	7.4
D-Orbit*	Beyond Earth/In Orbit Services	EU	Retained Asset	7.3
Satellite Vu*	Platforms/Earth Observation	UK	Follow-on	4.0
LeoLabs*	Product/Platform	US	Follow-on	2.1
Xona Space Systems*	Platforms/Navigation	US	Follow-on	1.9
Other (seed investment)	–	–	Follow-on	0.1
Total				**135.8**

Source: Seraphim Space Investment Trust. Note: *Participant in Seraphim Space Camp Accelerator and/or Amazon AWS Space Accelerator affiliated to Seraphim.

Cash at end December 2021 was £70m or 27.9% of SSIT's December 2021 net assets of £250.6m. Four further investments made since December account for £6.5m. Gearing is limited to 10% cumulatively at the holding level and is designed for bridging or working capital purposes. SSIT does not use structural gearing.

Space technology: Addressing a vast opportunity via technical innovation

The expansion in space enabled technology is already happening and its use is ubiquitous in telecommunications, real time data and navigation, all essential for human activity on the planet today.

Bank of America has forecast that the value of the space economy will triple in size to $1.4tn by 2030. Private sector investment is leading the push into commercial space tech investment as evidenced by SpaceX and a flourishing ecosystem of space start-ups, which collectively accounted for $12.4bn in investment in 2021 according to the Seraphim Space Index (end December 2021).

The industry has come a long way since the first commercial satellite was launched in the early 1960s. Increasingly, developments and the use of space technology are being driven through corporate rather than government initiatives (especially in low earth orbit) and to date only around 13,000 satellites have been put into space, principally serving the communication, weather and security industries. A recent key catalyst or inflection point for space technology has been the huge reduction in the size and associated cost of putting satellites into space, from car size units costing $1bn previously to shoe box sized satellites costing around $100,000 now (see Edison's report on The new space race). This development will spawn a huge increase in the satellite 'fleet' with over 200 individual companies expected to launch 100,000 satellites into space over the next 10 years according to Seraphim. This 'digital infrastructure of the sky' has profound implications for developments in sustainability (climate change), connectivity (internet for the 50% of the world not connected), mobility (driverless cars, flying taxis, drones), the Internet of Things (IoT) and smart cities.

Seraphim Space claim that space is a multi-decade growth opportunity, with next-generation activity developments driven by the falling cost of launch paving the way for opportunities such as data centres in space, which could reduce global warming as they are one of the biggest sources of carbon in the atmosphere. Solar farms in space, providing clean energy harvested by the sun direct to our planet, are already in the early stages of planning for operations over the next decade.

The fund manager

The AIFM for SSIT is Seraphim Space LLP, an established private equity operator specialising in space technology. Since its inception in 2015, It has supported around 70 (via investment or participation in affiliated accelerator programmes) early-stage space technology companies. Seraphim Space has co-invested and collaborated with over 20 high-profile upstream industry participants such as Airbus Defence & Space and successfully managed the private Seraphim Space LP Fund since 2016, which returned an annualised IRR of 49% from launch to end December 2021. It is also a prominent publisher of research and the quarterly Seraphim Space Index, which monitors in-depth trends in global private investment within the space domain.

The team: Experienced PE investors; extensive network of industry specialists

The executive investment team of Seraphim Space comprises Mark Boggett (CEO and managing partner), Rob Desborough (managing partner) and James Bruegger (CIO and managing partner). Before founding Seraphim Space, the team had previously worked together at YFM Equity Partners, working together since 2006 investing in small-cap technology start-ups and early-stage companies. Together with the wider investment team at Seraphim Space they filter through the 50 prospective deals that typically come across the desk each month (around 5,000 since 2016). Key to the proposition is that Seraphim Space has assembled a wide network of experts, contacts and co-investors to ensure good access to deal flow and comprehensive technical expertise and insight.

The executive investment team are experienced investors in and developers of private businesses. The wider team at Seraphim Space numbers 17 and has a broad range of backgrounds including aerospace, aeronautical and astronautical engineering backgrounds, such as Lewis Jones, and industry experience, such as the recently appointed Andre Ronsoehr, who worked for the Virgin Group helping to manage their investment in Virgin Galactic and Virgin Orbit. There is a reassuring combination of long-term private equity investment expertise with deeply technical and relevant academic and commercial space technology experience.

The high-calibre Investment Advisory Committee is an integral part of the investment process and consists of three experienced entrepreneurs. Candace Johnson and Matt O'Connell are veterans of the industry and Ann Winblad has spent her career in Venture Capital. Johnson was a founder or co-founder of companies such as SES ASTRA and Loral-Teleport Europe. O'Connell is a thought leader in the geospatial intelligence industry. In 2006 he founded GeoEye, which was a global provider of satellite imagery and digital mapping subsequently sold for >$1bn. Winblad is a managing director of Hummer Winblad Venture Partners and is a well-known and respected software industry entrepreneur and technology pioneer who has been involved with over 160 enterprise software company launches.

Seraphim Space's Advisory Board also contributes to the investment process. They scan the space technology horizon and provide high-level insight into future trends and developments in this fast paced and burgeoning area. This input has the ability to identify new technologies, applications and opportunities. The Advisory Board includes Mike Greenley, Jan Woerner and Sir Martin Sweeting. Greenley has over 25 years of experience in the defence and security sector and is chair of the board of the Canadian Association of Defence and Security Industries and CEO of MDA, a leading Canadian space business. Woerner was formerly director general of the European Space Agency, while Sweeting is chairman and founder of Surrey Satellites, a pioneer in designing and building lower cost smaller satellites.

Board: Complementary skills, a female majority and equal pay

The board of four is chaired by **Will Whitehorn**, who has technical expertise that is complemented by three other non-executive directors with extensive experience in relevant sectors.

Chair Will Whitehorn was formerly a director of Virgin Group and president of Virgin Galactic until 2010. He has since pursued a private equity and non-executive career. He is the president of UK Space, the trade body that represents the space industry in the UK. He has been a fellow of the Royal Aeronautical Society since 2013. Whitehorn explains 'I am interested in space, not for its own sake. I'm interested in space because I think it's absolutely crucial to the future economy of this country and for literally our survival from a climate/sustainability perspective'.

Sue Inglis has more than 30 years' experience advising listed investment companies and financial institutions including roles as managing director – corporate finance at Cantor Fitzgerald and

Canaccord Genuity. **Christina McComb** has over 25 years' experience of venture capital investment, as a former director of 3i plc and other venture funds. She has also held a number of senior public sector roles, including a non-executive role at the British Business Bank and advising government on initiatives to support access to finance in UK SMEs. **Angela Lane** has decades of experience working with private equity owned companies. She began her career at venture capital firm 3i and became a partner of 3i's growth capital business, overseeing the UK Growth Capital portfolio. Subsequently, she has held a number of positions as chair of private equity-backed businesses.

Exhibit 2: SSIT non-executive directors

Board member	Date of appointment	Remuneration for year ended June 2022	Shareholdings at 1 January 2022
Will Whitehorn*	July 2021	£50,000	100,000
Sue Inglis	July 2021	£50,000	50,000
Christina McComb	July 2021	£50,000	25,000
Angela Lane	January 2022	£50,000	27,284

Source: SSIT. Note: *Alison Whitehorn also owns 9,529 shares.

Market overview: New space, from disruption to revolution

Seraphim Space primarily operates in the 'new space' market, which has developed rapidly over the last decade; commercialisation in space has accelerated. In 2020, the overall space market generated revenues of around $370bn (source: Satellite Industry Association/SIA), of which the commercial satellite industry accounted for 73% of the total, at $271bn. The SIA breaks down this $271bn in 2020 between ground equipment $135.3bn (50% of the total), satellite services $117.8bn (44% of the total, of which around 75% is for television), satellite manufacturing $12.2bn (5%) and the launch industry $5.3bn (2%). The global megatrends of sustainability, climate change, communication, connectivity, mobility and asset tracking are driving increasing demand for the acquisition and transmission of space data, facilitated by increasing capability and lower costs of participation.

Historically geostationary earth orbit (GEO) satellites typically weighed several tonnes, with very long lead times and cost several hundreds of millions of dollars to launch and deploy. Their service lives are typically around 15 years. Advances in technology have enabled the development of highly capable but much smaller payloads on smaller satellite platforms weighing 5–150kg that are suitable for deployment in low earth orbit (LEO) and cost a few hundred thousand dollars to a few million dollars. These are able to provide increasingly timely and accurate acquisition and transmission of data. With a typical service life of five years, the rapid pace of technology development is captured as replacement satellites are deployed with upgraded payloads.

In addition, there has been a proliferation of new commercial launch vehicles over the last 20 years, which has driven down launch cost to less than $5k per kilogram.

In combination these two drivers have led to the development of the small satellite segment suitable for deployment in LEO constellations along with a variety of supporting technologies to provide the backbone infrastructure of such networks both on the ground and in space.

Only around 13,000 satellites have been launched since Sputnik in the early 1960s at the start of the space age. Since 2010 the number of small satellites (defined as weighing <500kg) launched has been a relatively small but growing number averaging <200 launches pa. Of some 3,400 satellites operating in 2021, around 2,500 have been deployed since 2019, the vast majority of which are small satellites. Over the next 10 years the number of new small satellites launched by the more than 200 participants is expected to exceed 100,000 but could be much higher. The mega

constellations being deployed by SpaceX and OneWeb are aspiring to deploy 100,000 satellites in that period.

The disruption does not mean the incumbent space market is technologically stagnant, but previous preconceptions are certainly challenged and are being disrupted as the global demand for data in many domains continues to grow, but the costs of participation are also reduced. Several fixed satellite service companies are participating in their own projects for applications such as support for the IoT, and governments are also seeking capability in the small satellite segment to augment requirements.

Investment to support start-up space investment rose sharply during the last decade, both in value and number. Private investment in space technology reached $12.1bn for 2021, beating the record for 2020, which was itself a record-breaking year. Q4 saw close to $4.5bn in investment, and record-breaking volume of 128 deals.

The risks in the new space segment are not dissimilar to historical ones, with project delays, launch failures, deployment problems and financing all still factors. Some new issues are apparent such as space debris. In addition, the affordability of participation access is leading to an expanding number of new entrants across the market, as countries recognise the ability to meet their own data requirements.

While the space market revenues can be divided by activity into four main segments dominated by services and ground equipment, Seraphim Space identifies around 35 segments. It is positioning itself to invest in early movers in various markets segments where it believes sizeable and profitable businesses can be built, while excluding certain segments where it believes the economics are challenging, for example the launch category.

Investment process: Seeking winners within vast addressable markets

Seraphim Space is seeking high-growth, early-stage space technology businesses that are addressing very large market opportunities. These opportunities are likely to persist for many decades, providing a long runway of growth and powerful long-term secular tail winds. Investee companies must embrace the vast potential of space, take long-term investment decisions, be leaders in their field and be willing to tilt towards the best multi-generational opportunities. These best in breed leaders with first-mover advantage are well placed to disrupt existing incumbents to address the wide opportunity set or to create entirely new markets via the application of evolving technology. First mover advantage can be hugely beneficial and create barriers to entry, for example Spire (which is one of the relatively mature listed holdings) is currently on its seventh generation of technology. Technical innovation is key, and it would require extensive investment for a new entrant to catch up. IP is also an important competitive moat for the category leaders, with a number of SSIT portfolio companies that have patents ranging from 100s to over 1,000. As first movers there is often a greenfield opportunity to patent cutting-edge technologies, which creates legal challenges for competitive followers.

Seraphim Space CIO James Bruegger notes ‘We're backing people first and foremost over anything else. We are long-term patient investors, looking to build relationships with entrepreneurs over the long term. We want to back those entrepreneurs that are most exceptional, those that have the proven ability to execute and have the biggest vision of how they're going to change our world for the better through the use of space’.

SSIT will apply the same consistent process that Seraphim Space has used to good effect since the launch of the Seraphim Space LP fund in 2016. It invests throughout the life cycle at seed, Series A

through D, pre-IPO and IPO stages and will take minority stakes, although it has identified the B to D series rounds as a sweet spot. At this stage companies have ironed out technical risks and demonstrated that the product has a place in the market. At series C and beyond, companies are establishing market leadership potential. LeoLabs and Isotropic Systems are examples of Series B and C investments. At December 2021 around 9% of SSIT was in Seed or Series A stage, with only six of the 21 holdings pre revenue (albeit all are pre profitable at this stage). Seraphim Space typically utilises preference shares, convertible loan notes and ordinary shares to access holdings rather than debt instruments. It will make follow-on investments at subsequent funding rounds, subject to a disciplined review of the milestones achieved by the underlying business. As a minority investor, Seraphim Space will potentially accept some dilution of a holding if the subsequent valuation is too high or milestones are not reached. Syndication of investments and the financial capability of co-investors is of key consideration. Seraphim Space does not invest alone, preferring to invest alongside well capitalised investors. For example, they co-led alongside Insight Partners in the HawkEye 360 Series D raising in November 2021. Insight Partners (a US VC and PE growth investor) operates a mega-fund of nearly $20bn, which shares the same long-term investment philosophy.

The first element of the investment process is to evaluate as many opportunities as possible; this allows a wide appraisal of the available opportunity set and developments in technology and applications. At this stage, only eight months since IPO, SSIT is around 73% invested via 23 holdings. We expect the residual cash to be largely deployed within the next six months, which is in line with the guidance given at IPO and confirmed to be on track by management on 23 February. The managers do not have a specific target for the number of investments but have guided for a portfolio over time of 20–50 holdings.

Seraphim Space has cultivated a very strong symbiotic network of expert contacts and co-investors. It has corporate partnerships with leading global multinational space companies, many of which are investors in its funds, including Airbus Defence & Space, SES, Telespazio and MDA. These corporate partners in turn provide Seraphim Space with access to their expertise to facilitate due diligence evaluation and portfolio company commercial collaboration.

Seraphim Space Camp and AWS Space Accelerator

Another innovative and unique source of deals and proprietary information is the associated Seraphim Space Camp/Accelerator scheme. The Seraphim Space Camp Accelerator is an affiliated programme and plays a key role in sourcing deal flow for the trust. These international accelerator programmes run several times per year for up to 10 space technology companies per cohort, for three months, which leads to them raising equity funding from other VCs. Through the subsequent careful ongoing monitoring of technical and commercial progression post-graduation from these accelerators, Seraphim Space is able to cherry-pick which graduate companies to back. The accelerator programmes also put Seraphim Space at the heart of the space technology ecosystem, building deepening relationships with the global investor community for co-investment and deal syndication.

Asset management

Portfolio management is carried out, in the majority of investments, via board representation, regular portfolio monitoring and continued utilisation of the ‘ecosystem’. Regular and close scrutiny of the investment assists in its development but can also highlight potential issues with the investment thesis or operational performance. Strategically, Seraphim Space aims to hold investments indefinitely as it takes time for these early-stage assets to mature – both in terms of technology and financials and to achieve value appreciation to reflect this. Three portfolio companies have listed on US markets, Arqit Quantum (September 2021) and AST SpaceMobile

(April 2021) on Nasdaq and Spire Global (August 2021) on the New York Stock Exchange. SSIT has not retained a board representation on any of these businesses.

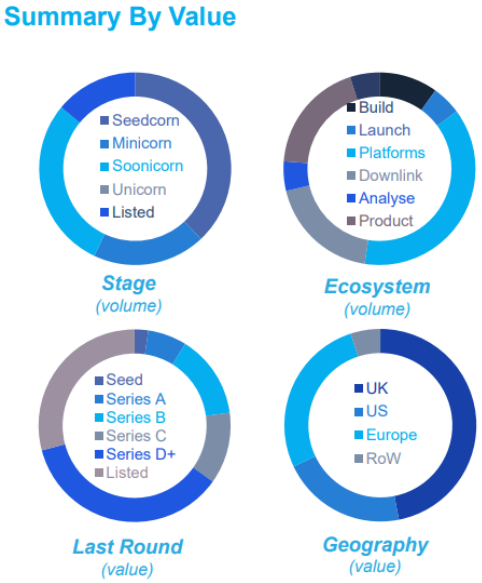
Since 2016 only one investment has been exited through a trade sale: when UltraSoC was acquired by Siemens (June 2020), having delivered an IRR of 80%. Nonetheless, for a portfolio of largely private companies, funding and the route to exit is also a key part of the management process. As part of the ongoing monitoring process, there is a quarterly portfolio review, where an update for each portfolio company is provided to the investment team.

Current portfolio positioning

SSIT currently has 23 companies in its portfolio, with 68% of the company's investments in the top 10 holdings. The manager considers there is considerable future growth in the 4.6% that represents the rest of the portfolio, particularly in companies like Spire, AST and Xona. By stage, there is just 2% of the portfolio in seed investments, 7% in series A, with the rest invested in +B series growth companies. We note that the three listed companies account for around 21% by value and only 14% by volume.

Seraphim Space uses its information advantage gained via its network and in depth understanding of the sector to identify and invest in businesses that are emerging category leaders, with high growth potential and to avoid what it would regard as the more commoditised areas of the market, such as rocket launchers. Seraphim's focus is around satellites and associated technology, such as connectivity, security and data – where digital platforms can be created in space to address the most crucial problems on the earth.

Exhibit 2: SSIT portfolio at December 2021



Net Asset Value

Company	FV £m	NAV %
ArQit	47.9	19.1%
Iceye	38.9	15.5%
Isotropic Systems	22.4	9.0%
Hawkeye 360	18.5	7.4%
LeoLabs	12.3	4.9%
Astroscale	9.3	3.7%
SatelliteVu	7.8	3.1%
D-Orbit	7.2	2.9%
Altitude Angels	3.7	1.5%
Planetwatchers	3.2	1.3%
Sub Total Top 10	**171.2**	**68.3%**
Other Investments	**11.4**	**4.6%**
Total Investments	**182.8**	**73.0%**
Cash	70.0	27.9%
Performance Fee Provision	-2.0	-0.8%
Net Current Assets / (Liabilities)	-0.2	-0.1%
Net Asset Value	**250.6**	**100.0%**

Listed portfolio 29% by value / 14% by volume

Source: Seraphim Space Investment Trust

Subsequent to the last NAV reported for end December 2021, there have been four investments in SSIT accounting for £6.5m, including a new investment of £0.2m into a US space situational awareness company (not as yet disclosed) and two follow-on investments. In March, SSIT completed a new £2.6m investment in Pixxel, which is an Indian-based developer of miniaturised hyperspectral satellite constellations and analytical tools capable of imaging the earth in optical bands invisible to the human eye. Its technology has applications in agricultural efficiency, environmental surveillance and pinpointing the location of natural resources. Meanwhile, some of the listed holdings have seen some quite significant declines in share price, reflecting the market

direction as long duration growth assets have sold off. SSIT made additional investment into Spire Global, doubling down on its stake. More positively the company's holding in D-Orbit is slated for listing, subject to a number of outstanding conditions via a special purpose acquisition company (SPAC; Breeze) in Q322 on Nasdaq with an implied enterprise value of c $1.28bn. D-Orbit shareholders will account for 84% of Breeze; SSIT currently owns 9.3% (fully diluted) of D-Orbit. A successful listing of this SPAC could be materially accretive to SSIT's future NAV.

Top five holdings at December 2021

Arqit (UK): Distribute unhackable encryption keys within the cloud

Arqit (ARQQ) listed on Nasdaq in September 2021, although Seraphim first invested in March 2018. It develops encryption for the cloud era, using a constellation of satellites equipped with laser communication terminals that use quantum technology to distribute un-hackable encryption to any end device. The advent of quantum computers could render traditional encryption technologies and infrastructure redundant. Arqit is addressing this issue through laser transmission of data that is secure and immune from quantum powered decryption. Arqit's founder had previously founded and successfully listed Avanti Communications and has a team of high-quality satellite and cybersecurity industry veterans supported by world-class consortium partners and significant non-dilutive funding from the European Space Agency. In its first set of results post listing for the financial year ending September 2021, despite posting losses, it had end-September cash and deposits of $87m and secured contracts valued at $130m. In February 2022, Arqit announced that it had signed a research and development agreement with the US Air Force to demonstrate the effectiveness of the technology.

ICEYE (Finland): Global change detection constellation

ICEYE operates the world's first and largest constellation of miniaturised satellites that use radar to image the Earth both during the day and night, even through cloud. ICEYE's radar technology has the ability to monitor change in near real-time with unrivalled sensitivity and at a global scale. Ultimately the aim is to monitor any square metre of earth every hour and provide change detection on areas of interest. It will then be able to provide change detection on how that point on earth changed in the last day, week, month or year. SSIT believes this dataset is hugely valuable; it is applicable to many industrial verticals. Seraphim first invested in 2017 before ICEYE launched its first satellite. SSIT announced in December 2021 that it had completed the purchase of the LP Fund's holding in ICEYE for £20.8m. Also during December SSIT invested a further $25m (£18.7m) leading the company's $136m D series funding.

Isotropic Systems (UK): Meshed satellite connectivity

Isotropic aims to create a network of ground-based antennas capable of connecting to any satellite in any orbit. The company is developing technology that can 'mesh' satellites together, linking to multiple satellite services for uninterrupted connectivity. This is especially relevant in mobility, allowing cars, trains, boats and planes to connect to the internet in all circumstances. The transportable design of the technology enables its use in portable consumer applications as well as maritime and defence and the company has recently conducted successful trials with the US military. In September 2021, SSIT invested $25.0m (£18.0m) in Isotropic's $37m Series B funding round. SSIT was the lead investor in this round.

HawkEye 360 (US): Mapping hidden activities

HawkEye 360 is the world's leading commercial provider of space-based radio frequency (RF) data and analytics. It operates its own constellation of satellites to collect, identify, process and geolocate a broad set of RF signals generated on Earth from very high frequency (VHF) radios,

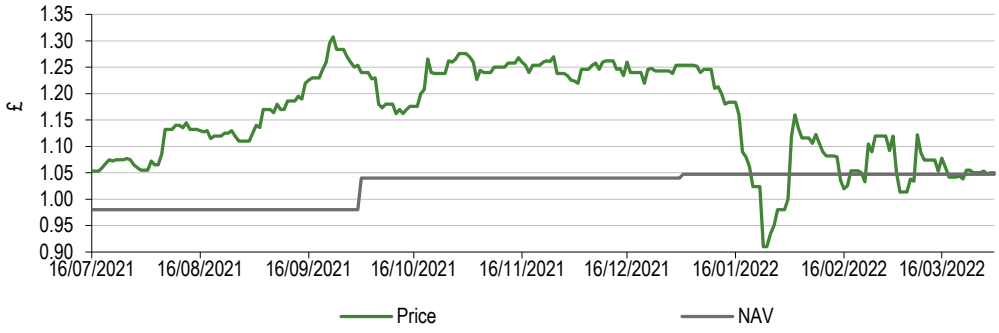
radars, cell towers, satellite phones, emergency beacons and more. HawkEye 360's analytics help first responders save lives, law enforcement halt hidden illegal activities and telecoms operators utilise spectrum. Its capabilities include mapping signals of interest, creating surveys of global spectrum usage and providing deeper visibility of maritime activities. It can help government agencies and corporations scrutinise borders, and counter illegal fishing, drug running, people trafficking and poaching, and assist where natural disasters limit the scope for conventional forms of surveillance. Seraphim co-led the $145m Series D funding round with a $25m (£18.6m) investment in November 2021.

LeoLabs (US): Space debris mapping

Space debris represents a systemic risk to the modern world. A collision between one satellite and another, or with a piece of 'space junk', could have potentially catastrophic consequences. LeoLabs uses a network of proprietary ground-based radars to track every piece of space debris down to 2cm in size as far as 1,000km up in orbit. By mapping the skies in real-time and monitoring 10x more objects than existing government-operated systems, LeoLabs is aiming for its cloud-based data platform to become the 'air traffic control' system for space that rocket launchers, satellite operators, regulators and insurers will rely upon. In July 2021, SSIT invested $3.1m (£2.1m) in LeoLabs through a combination of primary and secondary share subscriptions. This investment formed part of LeoLab's $65m Series B funding round, which was led by Insight Partners – a large US growth investor.

Performance: Very early days

Exhibit 4: NAV and share price return since launch



Source: Refinitiv

SSIT is a relatively new investment vehicle, having launched in July 2021. SSIT reports its NAV on a quarterly basis. The 31 December 2021 NAV was 104.7p per share at 31 December 2021 (end September: 104p), which is a 6.8% increase on 98p NAV (net of costs) in July 2021. The fair value of SSIT's portfolio at end December 2021 was £183m, which is an increase of £18.6m compared with the value of the portfolio that was acquired by SSIT at launch in July 2021. The listed component of SSIT, accounting for 21.3% of NAV, saw a mixed performance from Q321. Weak performance (Exhibit 8) from the listed AST Space Mobile and Spire Global, two small holdings within the portfolio, was more than offset by a strong performance from Arqit (reflecting share price return plus issuance to the company of earn-out shares). In a portfolio of early-stage companies at the cutting edge of space technology, it is inevitable that not all investments will succeed. The manager has demonstrated its disciplined approach to follow-on investment by ceasing to invest in two companies, both have been written down to zero as a consequence of missing technical and commercial milestones, with SSIT making a provision of £1.9m against these businesses.

NAV valuation methodology

An unaudited NAV is calculated quarterly in pounds sterling for end September, December, March and June. Publicly listed securities are valued at their bid price or last traded price (these currently comprise Arqit (ARQQ), Spire (SPIR) and AST SpaceMobile (ASTS)). However, the majority of the portfolio is unquoted. These assets are valued using International Private Equity and Venture Capital Association methodology including earnings multiples, discounted cash flow analysis or use of the value at the most recent funding round. More recent purchases may be held at cost until such time that alternative measures become more appropriate. Assets yet to generate profit or revenue are typically valued at the most recent funding round cost. The above factors, and the nature of the portfolio, containing early stage and unquoted assets, mean that there is likely to be an inherent element of lag in the quarterly reported NAV.

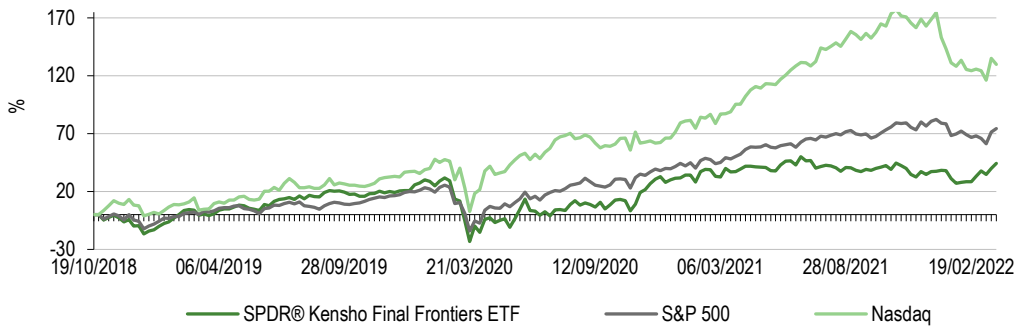
Peer group comparison: A lone wolf

SSIT has an investment focus solely on space technology, which makes it unique within the AIC group of companies. It sits within the Growth Capital category, which stipulates that the companies 'invest in unquoted shares and that they generally [like SSIT] take non-controlling stakes in early to maturing companies'. There are six companies within this sector and while the other constituents may have some investments in space related technology, it is not their main focus as it is for Seraphim. This makes peer group comparison a moot point within this esoteric and diverse group of companies.

There is a small group of relatively recently listed US ETFs that are focused on this area but the methodology or criteria for inclusion can be quite broad with exposure via listed equities that may have multiple revenue streams, diluting pure play exposure. They are also dominated by incumbents and include significant holdings in companies such as Trimble, Sirius and Lockheed Martin, which are in a different market and life cycle position compared to the small disruptors and potential winners of the future, which are SSIT's focus.

The SPDR S&P Kensho Final Frontiers ETF shares some commonality with SSIT in terms of seeking to invest in innovation in space (as well as other final frontiers such as deep sea), but, unlike SSIT, it invests in established (average $37bn market cap) profit-making companies such as Lockheed Martin, Raytheon Technologies and Northrop Grumman. Despite the divergence in investment approach and short investment history, it is perhaps illustrative to see the performance characteristics versus broad US equities and the Nasdaq. Fundamentally, a passive approach based on quoted equities and historical metrics does not seem the best way to play this theme.

Exhibit 5: Passive and listed strategies have failed to capture the growth



Source: Morningstar

We also note that there are a number of listed private equity, VC and early-stage unquoted growth investors that invest in space technology, albeit generally not with the same specific focus on the sector that SSIT has. Exhibit 6 illustrates the historical returns, drawdown and standard deviation from a selected group of companies that invest in largely unquoted growth-stage companies. While potential returns can be high, investors should be cognisant that they are likely to experience significant volatility.

Exhibit 6: Illustrative group of private growth-stage investments

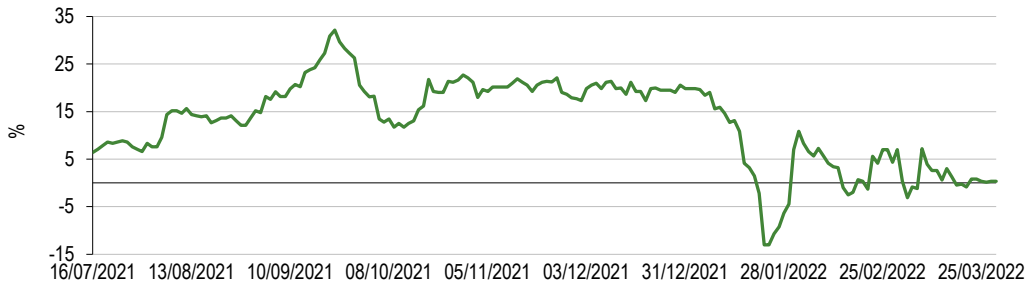
Name	Domicile	Total return 1 year	Total return 3 years (ann)	Total return 5 years (ann)	Total return 10 years (ann)	Latest discount (cum fair)	Std dev 3 years	Max drawdown 3 years
Schiehallion Fund	Guernsey	8.9	n/a	N/A	N/A	37.4	N/A	N/A
Molten Ventures	United Kingdom	11.0	13.0	17.0	N/A	N/A	38.3	-33.6
Augmentum Fintech	United Kingdom	19.1	11.0	N/A	N/A	5.6	9.7	N/A
Agronomics	Isle of Man	43.2	73.4	22.8	N/A	N/A	96.0	-47.4
Oakley Capital Investments	Bermuda	26.8	22.9	18.4	12.4	-19.0	22.1	-7.4
HgCapital Trust	United Kingdom	35.2	27.0	23.6	17.3	5.3	16.1	-6.1
Allied Minds	United Kingdom	-35.7	-23.4	-40.1	N/A	N/A	39.7	-69.6
IP Group	United Kingdom	3.0	-2.6	-12.6	1.0	N/A	40.6	-52.7
FTSE All-share	United Kingdom	18.90	6.75	5.42	7.41	N/A	15.68	-25.13
S&P 500	United States	23.29	20.71	16.78	15.43	N/A	17.54	-19.60
Nasdaq Inc	United States	34.04	28.11	21.69	22.72	N/A	21.33	-18.07

Source: Morningstar

Premium/discount reflects scarcity, valuation policy, illiquidity and market volatility

Since launch SSIT's share price has traded largely at a premium to its cum-income NAV, despite the high level of undrawn cash within the fund. More recently the share price sold off in sympathy with the general tech correction seen in the wider market, although, with some recovery, it now trades at around NAV.

Exhibit 7: Volatile premium/discount range since launch



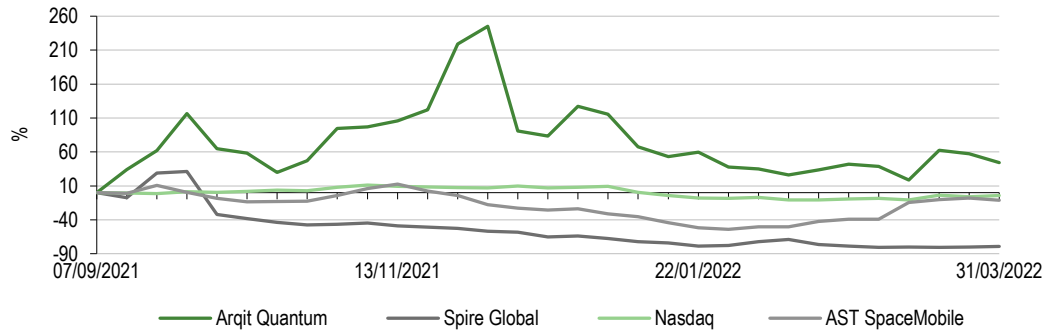
Source: Refinitiv

In general terms, we believe that SSIT's valuation (Exhibit 7) reflects the underlying illiquidity of its investments, leading to an inherent lag in the reported quarterly NAV. This is countered by the degree of investor interest in space and high (potential) growth technology and scarcity value, as the sole global listed investment vehicle focused on this industry. This can mean that while scarcity (of this type of pure space technology fund) points to an inherent premium, the valuation obscurity and, as we see currently, a significant technology stock sell-off can lead to episodes of high volatility, translating into periods of high premium and discount.

In 2022 to date the share price has seen significant volatility trading from 125.4p on 31 December 2021 to a trough of 91p on 25 January before recovering to 112p recently. High-growth, long-

duration assets saw a significant correction as the market rotated away from growth to value primarily due to inflation and interest rate expectations. The majority of the portfolio is unquoted, but it is worth referencing the share price movements of the three quoted holdings Arqit Quantum, Spire Global and AST Space Mobile, which at December 2021 accounted for around 23.7% of NAV. While Arqit's value increased from £36.1m to £47.9m, SSIT's holdings in Spire Global and AST fell in value over the quarter from £11.9m to £5.5m.

Exhibit 8: Quoted portfolio performance since July 2021



Source: Morningstar

Although SSIT is not yet fully invested, Seraphim Space has an identified near-term c £88m pipeline of investments. In the future, SSIT will likely conduct further rounds of equity issuance to meet its funding requirements as it strives to maintain its equity share in its portfolio holdings as they grow, although they may end up being diluted. While any additional equity issuance should limit upward pressure on SSIT's premium, as will future NAV uplifts, the company's uniqueness within the UK listed sphere, combined with its 'backward-looking' NAV, may mean that there will be potential volatility in the share price.

ESG considerations: The ultimate in impact investing

Seraphim Space is a signatory to the UN Principles for Responsible Investment and regards ESG factors as an absolute bedrock of the development in space technology and believes that space has a 'unique role' to play in addressing the climate crisis and, more broadly, driving and meeting the UN Sustainable Development Goals. Each of 17 of the private fund holdings that transferred to SSIT address at least two of the UN Sustainable Development Goals (UN SDGs), with most of the holdings addressing multiple goals. Seraphim Space has not yet published a stated ESG policy, but it is currently working with sustainability consultant Sancroft to develop the policy.

Space technology has the potential to address issues such as biodiversity security, with more powerful and granular observation from satellites helping to monitor illegal fishing and poaching for endangered species. More eyes on the planet can help manage and monitor deforestation and wildfire threats. According to the World Economic Forum there are currently more than 160 satellites measuring different global warming indicators, with more than half of essential climate variables only measurable from space,

Improving technology in the field of greenhouse gas monitoring via satellites can pinpoint areas of concern regarding building energy efficiency or escaping gasses from industrial or landfill sites for example. Better weather forecasting satellites have a host of applications and help ensure that renewable energy infrastructure is used to its best effect via the modelling of sunlight and cloud cover to optimise solar panel installations. More observation of the Earth could uncover better areas to tap into renewable energy sources.

GPS data from space provides the positioning, time and navigation for uses such as in autonomous driverless cars, flying taxis and drone deliveries, which will contribute to less traffic on roads, reduced congestion and lower emissions.

Satellite constellations could be an alternative to traditional internet access infrastructure, which may be uneconomical or unviable to install in some remote regions. A United Nations study found that 52% of the world's population still lacks access to internet, and 90% of those people are from developing countries. The benefits of connectivity from space could include healthcare and stronger GDP growth in developing regions of the world.

Over the longer term, as the price of sending a kilo into space continues to fall, demand for next-generation space commercialisation should escalate, for uses such as manufacturing in space, datacentres in space, in-orbit agriculture and solar farms in space providing clean energy to the planet.

Capital structure, life of the company and ownership

SSIT was launched via IPO in July 2021 and is an investment company on the premium segment of the main London Stock Exchange. There is one class of ordinary shares with 239.4m in issue. The company has no fixed life, but at the 2026 AGM there will be a continuation vote and at every AGM five years thereafter.

Fees and charges

Seraphim Space is entitled to a management fee of 1.25% pa of NAV up to £300m and 1.00% pa of NAV above £300m, payable quarterly in advance. The end-December 2021 NAV was £250.6m. They are also entitled to a performance fee of 15% over an 8% hurdle with full catch-up and subject to an absolute high-water mark. The performance fee is payable in cash, with 15% being reinvested by Seraphim Space subscribing for new SSIT shares (if they are trading at a premium) or buying shares in the market (if they are trading at a discount). The fee is only payable if covered by realised profits and is otherwise accrued. The management fee is in line with private equity peers, most of which will have some form of performance fee applicable also.

Risks and sensitivities

Comparators: SSIT has no direct competitors among open- and closed-ended funds, which makes direct comparison difficult for investors and there are no obvious benchmarks available. There are funds that invest in private growth-stage assets and technology and ETFs but these are invested in listed and largely mature ex-growth businesses of the sort that the SSIT portfolio seeks to disrupt.

Portfolio valuations: SSIT publishes a quarterly NAV, which accounts for the value of the holdings less liabilities. A majority of the portfolio will be unlisted and valued via International Private Equity and Venture Capital Association methodology Thus, some companies will not be readily valued and are not likely to be immediately marketable in the event that liquidity were required in the fund. It should be noted that there are quoted holdings that could be realised.

Past and future performance: whilst SSIT targets portfolio returns in excess of 20% pa over the long term, investors should not consider this to be a guaranteed or reliable estimation of actual return.

Business and execution risk: it is in the nature of investing in early-stage technology companies that it provides both an opportunity and risk in that the portfolio companies are immature and often

pre-revenue. This means that adverse macroeconomic, technological developments and competition could disrupt their business models and cause them to require additional capital, delay milestones or fail altogether.

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